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DIGITALFAX'S ROLE AS AN
AUTOMATIC CALL DISTRIBUTION SYSTEM,
AND IMPACT ON JOB SATISFACTION

A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Arts

By

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I HEREBY RECOMMEND THAT THE THESIS PREPARED UNDER MY SUPERVISION BY
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Abstract

Eliason, Mike. M.A., Applied Behavioral Science Program, Communication Systems and Technology, Wright State University, 1993. DigitalFax's Role as an Automatic Call Distribution System, and Impact on Job Satisfaction.

The impact of a new automatic call distribution system, DigitalFax, on employee productivity and job satisfaction in the workplace was investigated. The 62 employees of Northern Automotive Corporation's telemarketing department were administered the Multidimensional Job Satisfaction Scale in survey form to determine a preliminary level of job satisfaction. Over the course of the 12-week study, employees were given, over the DigitalFax, feedback on progress towards corporate goals, and public recognition for meeting or exceeding those goals. At the conclusion of the 12-week study period, employees were again administered the survey. Key performance data were compared before and after the implementation of the ACD system. Focus of study revolved around using DigitalFax as a tool to increase employee productivity by providing feedback towards goals, job satisfaction by giving public recognition for good work, and decreasing talk-time and wait-time. Over the course of the study, employee productivity increased significantly in total sales and orders taken. Also, there was a significant decrease in talk-time and increase in percent of orders to calls. Lastly, the employees who received the most recognition, had a higher job satisfaction score at the end of the study period.

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Chapter I. Background to the Problem

Northern Automotive Corporation (NAC) of Phoenix, Arizona, is the corporate headquarters of over 700 auto supply stores, including Checker Auto Parts, Kragen Auto Parts, AutoWorks, and Schuck's Auto Supply. The annual sales of the corporation are in excess of \$600 million. NAC's "special orders" department is connected by the 1-700 System Defined Network (SDN) which bridges each of the over 700 stores, eight regional offices, and five distribution centers. The benefits of this system are usage discounts, store level reporting and usage reporting. The purpose of the department is to take orders from members for auto parts that are not in supply or not stocked (special orders) at that store. The service representatives at the corporate headquarters take the call, look up the part number, price, location of that part, delivery date, and then place the order.

The department is broken into 10 teams where each works as a unit to share expertise and coverage. Each team consists of seven agents and one team leader. In addition, there are two supervisors who schedule and handle personnel functions. The department is open 16 hours a day, seven days a week. At peak times the agents answer 1500 calls per hour. At non-peak times there are 200 calls. The average time the member is "on-hold", while waiting for a representative is three minutes but may reach as much as 20 minutes during peak hours. The average amount of time the representative is on the line with the member is just over three minutes, with the average speed of answer 70 seconds. About .2% of the calls wait over three minutes to answer, and about 4% are abandoned prior to answer. As is obvious, the non-productive time "on-hold" costs as much per minute as the time the representative is talking with the member.

The current Automatic Call Distribution system NAC uses AT&T's Communication Managing System. Currently NAC spends \$218 thousand per week in total phone minutes with over \$32 thousand of that amount spent on non-productive "on-hold" time.

Many large corporations in America utilize Automatic Call Distribution systems to keep in contact with their outside corporate members. A similar problem for NAC exists with these other corporations; wasted time is wasted money. If a corporation could find a more efficient way of distributing calls so that the on-hold time is lessened, and if there was a way representatives could reduce the amount of the time spent with each member, telemarketing expenses could be decreased. Everyone needs to know when the number of customers on hold is excessive; there also is a need to communicate how sales are going. The focus is on sales and if the agents know that, then they may push harder for the sale. For this reason new systems of Automatic Call Distribution technology should be observed until the one that works "best" for an organization is found.

DigitalFax is one of the new systems developed by Visual Electronics LTD of Aurora, Colorado. The system is an innovative combination Information Management System, Light Emitting Diode, display board, and call distribution system.

The Automatic Call Distribution Monitor is a tri-colored system that changes color automatically depending upon the critical status of the message. The system includes one or more displays, five feet long with two lines of text. DigitalFax automatically communicates the rate of calls being received, average wait time, speed of answer, longest call in queue, production figures, and other MIS information. Because this system translates this information immediately and feeds it to supervisors in real time, it may increase efficiency.

Anything that can be communicated can be entered on the display boards from a keyboard: close dates, down systems, policy changes, sales results, meeting times, new product referral procedures, anything the representative may need to know. Through this method of communication, just one person would need to sort information and type into the system, saving photocopy and manpower costs. Also, information that needed to be disseminated immediately, time-critical information

where memos and announcements would be impractical, could be immediately entered into the system and viewed by the entire office simultaneously.

For NAC, four of the five foot long display boards would be installed into the special orders department consisting of 80+ service representatives. Sales by associate will be entered electronically, plus number of calls and key performance statistics. The shift supervisor can check the MIS system periodically, knowing immediately which representative has answered the most calls, which has been on line the longest, longest call in queue, wait time, etc.

The system's three-color capability is key and would be set by the supervisor. The system can be configured so that all the messages appearing on the display are shown in a specific color that corresponds to the urgency of any given moment. For example, when there are fewer than five calls in queue, the display will read in green. From five to 15, it will display yellow, and with more than 15 the messages would appear in red.

The system's function would be expanded to include not only memos and other management information on the display board, but also messages of positive feedback and individual sales results. For example: "Good Job Ann--Ann has answered 8 calls in the last hour for a sales total of \$5,000.00; most in the department!"

This is just one of many new ACD systems in the market, but the only one with the unique tri-colored display board capability.

Statement of the Problem

In today's big business there is considerable expense with communication systems. It is imperative that a system be efficient, getting the most productivity for the least cost. Northern Automotive Corporation's current method of call waiting is manual and state of the art, but it is still inefficient, costing the corporation more than a quarter of a million dollars per year for time waiting. The time the representatives are on hold, needs to be lessened. The time each

representative spends with the member needs to be decreased. The DigitalFax feature will interface with the current system and host computer, and it will be used to enhance the current system's capability.

Will the DigitalFax tri-colored display boards influence the representatives to answer calls more quickly and service the member more efficiently? Will the positive feedback of the display boards increase employee job satisfaction? Is there a correlation between job satisfaction and employee productivity? Will talk time of agents decrease if they know there are a critical number of calls in queue? If NAC establishes sales goals for each agent, will the constant feedback on progress to that goal influence agents to become more productive in trying to attain those goals? It would be neither scientific nor useful to make assumptions about the system without actual field research being done to examine the previous questions.

The Hypotheses

The hypotheses that guide this study are:

- H1: With instant knowledge of number of calls in queue, service representatives will answer calls more quickly and decrease talk-time in order to get to clients waiting in queue, therefore decreasing wait time of member resulting in savings for the corporation.
- H2: Employees who receive messages of positive feedback will have higher job satisfaction.
- H3: Employee job satisfaction is positively correlated with employee productivity.
- H4: With constant feedback regarding progress towards attaining a preset sales goals, agents will increase productivity to attain those goals.

Definition of Terms

Queue: Refers to a number of calls "in-line," waiting to be answered.

Positive feedback messages: Refers to messages displayed on fax board that shows exceptional progress towards predetermined sales goal.

Job satisfaction: Refers to a combination of variables that determine a subject's contentment with current job. Variables include physical working conditions, satisfaction with co-workers, satisfaction with pay, satisfaction with promotion prospects, and opinions of immediate supervisors.

Productivity: Refers to an agents sales totals and number of calls answered.

Wait time ("on-hold"): The time a customer is in queue, waiting for an agent.

Automatic Call Distribution system: System that takes a large volume of telephone calls and distributes them efficiently to available answering positions.

Purpose of Study

Northern Automotive Corporation has the top-of-the-line Automated Call Distribution system on the market today. Still the corporation loses \$32,000.00 per week in customer wait time. Another four percent of all calls are abandoned prior to answer, therefore using expensive minutes but with no productivity. In a corporation which has more than \$600 million in sales per year, four percent "no-sale" abandoned calls adds up to a considerable amount of money lost to the corporation. The bottom line is "How does Northern Automotive Corporation get the agents to answer calls and service the customer more quickly.

The DigitalFax system, interfaced with the current system, provides agents with real time feedback regarding how many calls are waiting in queue. Northern Automotive Corporation wants to expand the

use of the system to display sales totals to agents, as well as messages of positive feedback to agents who perform highly, for all agents to see.

Northern Automotive Corporation has set sales goals, both individual and for the group. The DigitalFax will display feedback for agents in regard to meeting the goals set for them. Also, the messages of positive feedback will be based on individual sales goals.

The purpose of the study is to determine if:

1. Corporate set goals, along with DigitalFax feedback towards the progress attaining those goals, will increase agent productivity.
2. Agents who come closest to meeting or exceeding those individual goals, and who receive public positive feedback, are more satisfied with their jobs than those who do not receive the positive feedback and, thus, are not close to meeting individual goals.
3. Agents know the critical status of calls in queue, calls will be answered more quickly, thus, decreasing wait times and abandoned calls.

Chapter II. Review of Literature

Automatic Call Distribution Systems

In the 1990's, the effective and efficient use of telecommunication technology will be a primary competitive advantage businesses use to stay ahead of the competition, both at home and abroad. One of telecommunication's most useful tools is the automatic call distribution (ACD) system. Automatic Call Distribution or simply "ACD" takes a large number of incoming calls and distributes them efficiently to available answering positions. Ever since Collins (now Rockwell) introduced the first modern computerized ACD in 1973, it has been rare for the full potential of ACD technology to be realized. When it is used wisely, it enables call centers to realize tremendous gains in efficiency and capability (MacPherson and Cleveland, 1990).

The purpose of ACD is to maximize a center's efficient use of agents and telephone lines/positions. Through the use of this facility, companies with ACD gain a competitive advantage by reducing time and resources it takes to reach and service customers. This is also a cost-effective way of using agents (employees who answer incoming calls) and lines to connect the service centers to the outside world.

There are two primary conditions for the use of the ACD system. First, a calling customer wants a specific service, not a specific person. Second, anyone within an agent group can handle the caller's request. For example, in booking travel arrangements for a trip, the caller wants to speak with an experienced travel agent; any agent who can provide the service will do (Tanzillo, 1991).

With this basic premise, an ACD system automatically answers all calls, places them in queue for the next available agent (if one is not immediately available), distributes the calls according to predefined paths or equitably balance activity among the agents, and provides timely management reports on the status of the system (Stockberger and Castro, 1991).

ACD systems can be purchased to fit a wide range of budgets, with a variety of attached devices--automated attendant, voice response units, and predictive dialers, and has a wide range of capabilities. There is no single answer to the question: How big does an organization have to be to need an ACD?

Answering that question involves analyzing the following issues:

- Why do people call into your organization, and are the callers willing to wait?
- Is manpower sufficient to assure that a high percentage of calls can be answered before callers abandon?
- Are there sufficient incoming calls to warrant a call center system (MacPherson and Cleveland, 1991)?

Most ACD systems do more than distribute calls optimally among phone reps. They offer a supervisory function that delivers management reports. Usually these reports measure call center performance. These systems provide many different types of reports that are necessary to give a clear picture of what agents are doing. These include the following:

- Percent of 1/2 hour achieving a service level target.
- Abandon rate and number of abandons.
- Busy rate and number of busies.
- Average answer time.
- Average abandon delay time.
- Longest answer delay time.
- Longest abandon delay time.
- Percentage of calls answered or abandoned in X seconds.
- Average agent holding time (contact time) (Borton and Lutton, 1991).

In the competitive corporate world, time is money. ACD systems provide the advantage of increased services, reduced costs, greater productivity, reduced turnover and, ultimately, the generation of more revenue and more profits.

Businesses that currently use ACD extensively are grouped into the following areas (Hu, 1990):

- Reservation centers
- Order processing centers
- Repair centers
- Account inquiry centers
- Customer service centers
- Government centers
- Emergency centers (911).

Current analysis of the ACD industry suggests that only 23 percent of the midsize to large companies have ACD. The future growth in the ACD industry will come from both current and new users. Current users will expand their ACD centers because of growth in their business, while new users will recognize the need for an ACD center to stay competitive in their own industry. Once business begins to learn the full capabilities of the telephone, the need for ACD systems will rise (Hu, 1990).

The following are corporations that either recognized a new need for an ACD system, or a need to improve the outdated one. All of the example companies showed considerable profit directly related to the new systems.

Delta Service Plans Insurance Company of Atlanta now uses call distribution to handle dental insurance claims for an 11-state region. Seven agents cover about 300 calls a day now. Previously, it was impossible to determine how many calls they handled.

In the past, Delta channeled all its 800-number calls through two receptionists. The first screened incoming calls and sent benefit-related calls to the second receptionist. She in turn directed calls to the specific agent who could help the caller, which meant sometimes an agent might have two or three calls waiting on hold while another agent didn't have enough to do. An undetermined number of callers would abandon calls in frustration over long wait times.

Delta installed a new ACD system to combat this problem. No longer does one agent cover a particular area or type of customer group. Now any agent can help any customer. The new approach has freed up one staffer, the secondary attendant, who used to monitor the benefit services representatives' calls under the old system. No longer does Delta have customers on-hold for long lengths of time, an increased customer service (Tanzillo, 1992).

At Northern Trust's call center in Chicago, service agents handle about 50,000 calls a month from corporate client's employees and retirees. Their job is to manage the corporate money market accounts for these customers. Northern Trust's previous system included 12 customer service agents and one manager to staff an inbound call receipt center.

Although having enough personnel to handle the volume of calls, it was apparent the telecommunication system that was in place was inadequate for the job. The original system could not track call volume to specific agents, the number of abandoned calls, or calls lost in queue. The only statistics available were an aggregate of calls being handled.

At the end of the work day, the manager would get a report that simply told the number of calls received or abandoned. As a result the corporation had no idea of how well it was serving its customer. The only solid bit of information was the call abandon rate and that rate was unacceptable--running between seven and 10 percent. "We did not fully understand that efficient call handling is the lifeblood of this service," Juan Sistachs, Vice President-Cash Management, Northern Trust Co. (Sistachs, 1991).

In selecting a new system the corporation made a list of priorities. Above else it wanted a system that would allow it to handle calls more quickly and efficiently. It also wanted to be able to measure performance--more in-depth statistical reports.

Northern Trust decided on an AT&T ACD system. The corporation saw an immediate upswing in service levels after installing the new system.

The corporation's three performance goals had never been reached under the old system:

- Keep the average hold time to 25 seconds or less.
- Answer 80 percent of all calls within 25 seconds.
- Keep call abandon rate to less than two percent.

Since installing the new system all three goals have been met or exceeded. Average hold time is 23 seconds; about 53 percent of calls are answered within 10 seconds and call abandon rate is less than one percent. The corporation has increased business by 67 percent, yet has maintained the same staff levels. In a customer service business, a primary concern is keeping the time customers are on hold to a minimum. Hold time is directly correlated to abandoned calls--which means lost business as well as paying for totally nonproductive minutes (Sistachs, 1991).

Las Vegas Travel (LVT) provides reservation service to approximately 55 hotels throughout the United States, with a majority of clients in Las Vegas.

Under an old system of phone management, LVT lost about 10,000 to 15,000 calls per month. With an average sales per call of \$200, saving those calls was paramount.

"Our old system required incoming calls to be answered manually. It was a very slow and inefficient way of doing business. We realized this situation was making it difficult for us to grow and improve our profitability," said Gerritt Beatty, operations manager at LVT ("Travel firm has", 1992).

With a new ACD system, 12-15 agents working at any given time, handle 45,000 calls per month on 43 inbound WATS numbers.

The Management Information System Processor built into the system provides four real time displays that enable ACD group supervisors to monitor the current activity of individual agents, groups, or the entire

ACD operation. It also generates 10 historical reports that can be displayed on a monitor and printed out. These reports analyze and evaluate agent, group and system performance for up to two years. The new system has increased the revenue of LVT by nearly one million dollars ("Travel firm has," 1992).

Work Motivation

Since the turn of the century, industrial-organizational psychologists have been trying to understand the intricacies of employee motivation and satisfaction. Fredrick W. Taylor, the founder of "scientific management", was a pioneer in advocating the use of scientifically designed incentive systems as a means of motivating employees.

Until recently, three problems have prevented the development of a integrated model of work motivation and satisfaction. First, no adequate conceptual framework existed for understanding and explaining the motivation to work. Second, there was no clear framework for understanding job satisfaction. Third, and most difficult, was the problem of how to tie motivation and satisfaction together (Champoux, 1991).

From the 1950's on, research had shown clearly that the motivation to perform (effort, productivity) and job satisfaction were not strongly associated (Locke, Frederick, Lee, and Bobco, 1984). In the last two decades, however, there has been sufficient progress in theory and research to make possible the development of a model, one that integrates key elements of existing theories of motivation and satisfaction.

The motivation to work can be explained by integrating elements of three theories, goal setting theory, expectancy theory, and social-cognitive theory.

Goal Setting Theory

Goal setting theory (Locke and Latham, 1984, 1990) asserts claims that task performance is regulated directly by the conscious goals that individuals are trying to attain. Nearly 400 studies have shown that specific, difficult goals lead to better performance than specific easy goals, vague goals such as "do your best", or no goals. These results are based on studies in the U.S and seven other countries. The studies have used more than 40,000 subjects, 88 different tasks, time spans ranging from one minute to three years, and many different performance criteria, including behavior change, quantity and quality outcomes, and costs. The findings emerge at the levels of the individual, group and organization (Locke and Latham, 1990).

In order for goals to affect performance, there must be commitment to the goals, the individuals must be truly trying to attain them (Erez and Zidon, 1984). Generally goal commitment is highest when people think they can attain the goals (Locke, Latham, and Erez, 1988).

A surprising finding of research on goal commitment is that assigning goals to individuals generally leads to the same level of commitment and performance as letting them set their own goals (LaPorte and Nath, 1976).

Assigned goals have a strong influence on personal goals (Garland and Adkinson, 1987). Several factors explain the effectiveness of assigned goals. First, they are typically assigned by people with legitimate authority (i.e. supervisors). Authority figures can have a powerful influence on a subordinate's compliance (Garland, 1984). Second, the act of assigning a goal to a subordinate implies that the authority figure has confidence that the subordinate can reach the goal; this in turn, affects the subordinate's self-confidence (Salancik, 1977). Third, assigned goals, if difficult pose a challenge to people; this motivates

them to use the task situation to improve their skills and prove their competence (Mento and Locke, 1990). Fourth, assigned goals help to define the standards people use to attain self-satisfaction with their performance (Bandura, 1986).

Goal setting is more effective when feedback allows performance to be tracked in relation to one's goals. Goal setting without feedback appears to have little long term effect on performance (Strang, Lawrence, and Fowler, 1978). Also, just as importantly, feedback without goals also has little effect on performance. When goal setting in response to feedback is prevented, feedback does not motivate high performance (Locke and Bryan, 1969a). Goals provide workers a yardstick to determine whether the feedback they are given reveals acceptable or unacceptable performance. Without a goal or standard, people do not view feedback as significant, and thus do not take action in response to it (Locke and Latham, 1990). For goal setting to be effective, individuals must have the ability to reach or approach the goals (Locke, 1982).

In other motivation theories, namely Expectancy Theory (Vroom, 1964) and Social Cognitive Theory (Bandura and Cervone, 1986), goal setting is an integral element. When goals are assigned, expectancy still makes an independent contribution to performance, providing that the goal difficulty is controlled; that is, within any given goal difficulty level, the association between expectancy and performance is positive (Locke, Motowidlo, and Bobco, 1986). Expectancy theory predicts and the research shows that the maximum performance occurs when goals are difficult rather than moderate (Locke, 1968). Social Cognitive Theory shows individuals with high goals, as compared with those with low ones, are more likely to believe that goal pursuit will be associated with a sense of achievement, improvement of one's skills, and the opportunity to prove what one can do (Mento and Locke, 1990).

The mechanisms by which goals affect performance are tangible and definable. High goals lead individuals to persist longer at tasks than do low goals (Bandura and Cervone, 1986). People with high goals are not satisfied until they reach their goals or get as close to them as they can. High goals also lead people to exert more effort (work harder) on tasks with time limits. Goals also direct attention and action toward goal relevant activities in place of actions which will not attain the goal (Locke and Bryan, 1969b).

Goals also affect performance by stimulating people to develop plans to attain their goals (Earley, Wajnaroski, and Prest, 1987).

A field experiment by Pritchard, Jones, Roth, Stuebing, and Ekeberg (1988) demonstrated how a program of goal setting and feedback can favorably affect productivity and attitudes. The experiment was conducted with five groups of Air Force personnel totalling 80 individuals over the course of the study. One group repaired electronic equipment, and the other four were involved in storage and distribution of materials and supplies. Productivity measures were compiled over nine months. For the first five months, the groups received monthly feedback on their productivity. For the following five months, each group set difficult, but attainable productivity goals for itself. On average, productivity improved fifty percent during the five month feedback period, which the experimenters pointed out probably involved informal goal setting by the groups as well. When formal goal setting was added to feedback, productivity improved an additional 25 percent. Significant improvements were also found in measures of job satisfaction and morale. Taken together, the results strongly support the positive motivational effects of setting specific, difficult, but attainable goals, coupled with feedback on performance.

Goal attainment and job satisfaction have been found to have a positive correlation with each other. This correlation stems from an individual feeling rewarded for performance (Mobley and Locke, 1970). Usually this is a self-administered reward, meaning the appraisal an individual makes of herself/himself by comparing her/his performance to his/her internal goals or standards (Bandura, 1986). In goal setting studies, these standards consist of the performance goals assigned by others, or the goals one has set for herself/himself.

The finding regarding satisfaction and goals is that performance that is successful in relation to a given standard is appraised positively and leads to more self and task satisfaction, pride in performance, and a sense of achievement (Locke and Latham, 1990, report a mean correlation of .51 between degree of success and satisfaction across 12 studies).

The finding that goal success produces satisfaction poses a dilemma for those who assign goals to others and even for those who choose their own goals. Clearly easy goals produce more satisfaction than difficult goals (Locke, 1965), both because they are attained more frequently and because they yield a greater degree of satisfaction for any given performance. On the other hand, difficult goals produce higher performance than easy goals (Hollenbeck and Klein, 1987). Thus, if goals are set at a low level, the individual will be satisfied but unproductive, and if they are set at a high level, the individual will be productive but unsatisfied. There are a number of solutions to this problem. First, goals could be set at a moderate level so that a moderate degree of both productivity and satisfaction will occur (Peters, Chassie, Lindholm, O'Connor, and Kline, 1982). Second, goals could be made difficult incrementally rather than all at once by constantly raising the goal level above the levels of previous attainment. This principle, called "Kaizen" (meaning constant

improvement), has been used successfully by the Japanese (Imai, 1986). Also, goal difficulty could be defined as how much time, thought, effort, resources, were required to attain the goal rather than in terms of probability of success. Thus, difficult goals would be ultimately achievable and yet still motivate a high level of performance. There are innumerable combinations that could provide the right mixture of satisfaction to performance.

What occurs as a result of a worker being satisfied or dissatisfied?

As noted earlier, satisfaction does not necessarily result in higher performance and productivity. Recent studies (Henne and Locke, 1985) have revealed that being satisfied or dissatisfied with a job can lead to a variety of different actions. Employees who are satisfied are more likely to stay on the job and to engage in citizenship behaviors, such as helping coworkers or customers and doing extra work (Organ, 1987). Those that are dissatisfied are more likely to quit the job, be absent, file grievances, join unions, go on strike, protest to higher management, engage in substance abuse and illegal drugs, and put forth less effort; all of which ultimately cost a corporation money (Henne and Locke, 1985).

Job satisfaction has shown to be strongly correlated to organizational commitment. Locke and Latham (1990) reported a mean correlation of .64 between satisfaction and commitment in 11 studies. Mowday, Porter, and Steers (1982) defined organizational commitment as:

- the acceptance of goals and values of the organization;
- willingness to exert effort on behalf of the organization;
- a desire to stay with the organization.

If satisfaction promotes commitment, it means that satisfied people will more likely than dissatisfied people to both remain

with the organization and to accept any new challenges that it might offer. High challenge, in turn, will produce high performance.

Chapter III. Methodology

Subjects

The subjects for this study consisted of 62 members of Northern Automotive Corporation's "special orders" department. Of the 62 members studied, 50 were male. All members were high school graduates with four having received bachelor's degrees. Subjects ages ranged from 19 years old to 54 years old; the mean age was 31 years old.

Procedure

All subjects were given the "Multidimensional Job Satisfaction Scale" (Shouksmith, Pajo, and Jepsen, 1990), one week prior to the DigitalFax system's implementation. Items on the survey not relevant to the corporation were deleted and substituted with more applicable questions. On the initial survey, data was collected regarding what employees thought corporate goals should be regarding talk-time, dollar sales average, percent of sales to calls, and customer service scores.

Sales data for each employee were collected for the three months prior to the study, during the study, and for the next three weeks after the study period. The data included total dollar amount of sales and number of calls.

Prior to the implementation of the DigitalFax system, managers stressed the newly established corporation goals for talk-time, percent of sales to calls, and total dollar amount of sales. These goals were chosen by management after reviewing the employees' feedback on realistic goals.

Automatic Call Distribution data were also collected previous to the study, during the study, and after the study period. The data included total number of calls, number of calls abandoned, percent of sales to calls, average speed of answer, talk-time, and number of calls lasting over three minutes.

During the 12-week study period, data were displayed over the DigitalFax in the following manner (See Table 1):

Table 1Frequency and content of DigitalFax screen messages

	<u>Daily</u>	<u>Weekly</u>
\$ Sales totals per member	d	
\$ Sales totals per team	d	
\$ Sales totals for dept	d	
Messages of positive feedback	d	
Office meetings		w
In-charge supervisor	d	
Special Projects		w
Emergency Information		w
Computers off-line	d	
Merchandise info	d	
	d	

The messages of positive feedback ran 12 times per hour. Every time a message of positive feedback was given, the member and the frequency of messages was documented to examine whether members who receive recognition on the job increased productivity and job satisfaction.

On a separate screen, centered in the facility, updated sales information continually flashed throughout the workday, so members had immediate feedback as to their progress toward sales goals. The tri-colored display indicated to each member how many calls were in queue. If there were less than 10 calls in queue, the display read green. From 10-30 calls in queue, the display read yellow; and for more than 30 calls in queue, the display read red.

At the end of the 12-week study, the members were again given the "Multidimensional Job Satisfaction Scale". Answers were compared to the previous survey, with special attention paid to the members who received the most messages of positive feedback.

The Instrument

The instrument to be used in the study was the "Multidimensional Job Satisfaction Scale" (Shouksmith, Pajo, and Jepsen, 1990). The 7-point bipolar scale has an alpha reliability of .83. A correlation between the over-all score on the scale, used as a positive evaluation of the job in question and other independent measures of over-all job satisfaction was .79.

Items deleted from the original scale included questions regarding pay and physical working conditions. Because of the nature of the job, opportunities for higher pay are very limited; the salary each member receives is standard with similar jobs in telemarketing. Questions regarding physical working conditions of Northern Automotive Corporation were deleted because of the modern facilities in the "special orders" department. The department's environmental are modern and the equipment used by each member (i.e., computers, headsets, and catalogs) is continually replaced when a more efficient or modern replacement is developed.

Items added to the scale included four questions asking each member what a realistic goal for each talk-time, dollar sales average, percent of sales to calls and customer service scores, would be. These questions were included so management could determine if management set goals are comparable to employee set goals. Another question that bluntly asked "As far as total job satisfaction I am: (see Appendix A), was included.

Chapter IV. Analysis of the data

Differences between pre and post surveys were analyzed using Chi-square with alpha value of .05. Significant differences in the subject's answers between the tests were evident in six of 11 questions. In all six questions where significant differences were shown, movement of the responses was toward the higher end of the seven-point Likert scale. Respondents tended to agree with the statements more in the second survey.

Table 2

Chi-square from pre- and post-job satisfaction surveys

Question	Value
Goals are clearly stated	36.322*
Rewarded for meeting goals	17.173*
Important to set department wide goals	6.893
Encouraged frequently by management	20.036*
Recognized for doing good job	28.024*
Job allows you to reach potential	15.414*
You consider job a secure one	7.957
Your job is challenging and exciting	8.748
Job makes most of your skills	12.821*
Job requires high level of responsibility	3.787
You would welcome higher responsibility	4.733

*p < .05

Chi-square was the method of analysis for the variables total job satisfaction and the number of positive feedback messages. Subjects who received 1-15 messages were placed in the first category, 16-30 in the second and more than 31 in the last category. Chi-square analysis showed that subjects who had the most number of positive feedback

messages also had higher job satisfaction scores (Chi-square = 34.550, $p = .0000$).

Performance data (i.e., number of calls, abandoned calls, percent of sales to calls, speed of answer, talk-time, calls over three minutes) were gathered over periods of one week for each of the three months prior to the DigitalFax being implemented; two periods of one week each during the middle of the study, and two periods of one week each taken after the study period.

Table 3

Totals of data collected during study

Week	Calls	Abdn	Percent	Speed	Ttime	+3
Pre 1	49166	2012	28.31	69.93	187	106
Pre 2	48840	3741	29.33	42.11	181	428
Pre 3	50111	5185	29.31	51.21	183	288
Mid 1	48047	1623	31.44	33.52	178	275
Mid 2	50034	3180	31.27	25.32	172	360
Post 1	45440	2476	31.05	23.00	174	190
Post 2	51231	3221	31.62	23.33	172	158

Table 4**Means for data collected during study**

Variable	Mean	Std Dev
Calls	49385.67	1033.17
Abdn	3646.00	1588.63
Percent	28.983	0.5832
Speed	5441.67	1418.45
Ttime	183.667	3.0550
Over 3	274.00	161.455
Mid:		
Calls	49040.50	1405.02
Abdn	2401.50	1100.97
Percent	31.355	1623.00
Speed	2942.00	579.827
Ttime	175.00	4.2426
Over 3	317.50	60.104
Post:		
Calls	48335.50	4094.86
Abdn	2848.50	526.7945
Percent	31.335	0.403
Speed	231650.00	23.3345
Ttime	173.00	1.414
Over 3	174.00	22.627

The results of the analysis of variance (ANOVA) for the performance data showed the increase in sales to calls percentage and the decrease in talk-time were statistically significant. A third variable, speed of answer, approached significance.

Table 5Analysis of variance for performance data

Variable	SS	df	MS	F
Calls	1331434.33	2	665717.167	0.13
Abdn	1986850.714	2	993425.357	0.61
Percent	9.56177	2	4.780	22.31*
Speed	13950714.547	2	6975357.273	6.40
Ttime	164.1	2	82.095	8.49*
Over 3	21960.357	2	10980.178	0.78

*p < .05

A paired comparisons t test was conducted comparing the amount of money each employee made for the company and the number of orders each employee took prior to the test period and then after the test period. The \$1,241.70 increase in productivity per week per employee was significant as well as the almost 27 orders per week per employee increase.

Table 6Paired comparison t-test for retail sold and orders taken

	N	Mean	Std Error	T Prob>	[T]
Retail	62	1431.70	99.767	14.350	0.0001
Orders	62	26.696	1.207	22.102	0.0001

Chapter V. Discussion and Conclusions

Pre- and post- surveys

The results of the Chi-square analyses comparing the pre-study survey to the post-study survey show an obvious shift in attitudes in several areas. It should be said now that Northern Automotive Corporation's special orders department took preliminary data collected on employee set sales and performance goals and set department wide goals. These goals were publicized in team meetings, memos, and word of mouth. This at least partially explains the obvious shift in several of the questions including "The goals and expectations of each associate are clearly stated and emphasized" where the shift was overwhelmingly towards the strongly agree side of the seven-point Likert scale.

A more moderate shift from strongly disagree toward a neutral position occurred for the statement "You are rewarded for reaching these goals and expectations." Since NAC does not offer monetary bonuses for reaching these goals, it seems the "reward" may be the recognition of having one's name displayed over the DigitalFax for doing an exceptional job.

The statement "It is important to you for management to set department-wide goals for associates" showed fairly high agreement on both the pre- and post- surveys, therefore showing no significant shifting in answers. Statement #4 on the survey, "Associates progressing towards job performance goals are encouraged frequently by management," shows a significant shift in attitude seemingly due to the new emphasis on goal attainment by the team leaders and management. And statement #5, "Associates are recognized for doing a good job," showed a significant shift in attitude toward strongly agree, could be due to the recognition each member received over the DigitalFax for exceptional performance.

The statements, "You consider your job a secure one," and "You consider your job challenging and exciting," showed no significant shifts in subjects attitudes. For "You consider your job a secure one,"

the employees' answers on both surveys were from the mid to upper "Strongly agree" side of the scale. Respondents were spread relatively evenly across the scale on both pre- and post- surveys for "You consider your job challenging and exciting." The insignificance in shift for these two questions is not surprising since neither the DigitalFax nor the study itself aimed to change either.

The last significant change in attitude occurred with the statement, "Your job makes the most of your particular skills." The responses shifted from a "Strongly Disagree" toward a more neutral attitude.

Employees differed in their opinions for the statement "Your job requires a high level of responsibility," on both surveys, being evenly distributed across the scale.

Overwhelmingly, on both the pre- and post- surveys, employees strongly agreed with the statement, "You would welcome a higher level of responsibility." Neither of these statements showed a significant change on either survey, neither affected by the DigitalFax nor the new emphasis on goal attainment.

DigitalFax

The purpose of the DigitalFax as an Automated Call Distribution system is to more efficiently distribute calls to agents. This in turn, with the tri-colored method the system uses to inform agents of the number of calls in queue, should have impact on some particular areas of the performance data.

For the variable calls there was no significant change during the study. This is not surprising because the system can not affect the number of calls being made to the special orders department. The number of calls remains constant around 50,000 calls per week.

There was also no significant change in the number of calls abandoned. This may be explained by the fact that the number of calls

abandoned is completely random, not correlating with number of calls, talk-time, or speed of answer.

The number of sales to calls percentage showed a significant increase from 28.31 percent to 31.62 percent. In special orders, clients call looking for hard to find or non-stocked auto parts. Sometimes it is difficult to find some parts so the special orders employee must put forth "extra" effort to find that part when it would be just as easy to say the part is not available. Often times clients call to inquire on the price of a particular part looking for the lowest priced part. The agent can also press for the sale by reminding the client of the corporation policy of underselling all other auto parts chains by five percent. By "selling" the product, agents can increase the number of sales to calls percentage. The significant increase in percentage of orders to calls can be attributed to the emphasis on reaching the corporate goal of 35 percent and the constant feedback provided by the DigitalFax system on progress toward that goal. The agents seem to be trying harder to "make the sale" and reach the goal.

Although the speed of answer did not show a significant decrease (F value of 0.0567; needing a value of 0.05), the time dropped from a mean of 54.41 seconds to 23.15 seconds. Possibly, if more samples could be drawn from the weeks after the system was implemented, the speed of answer would show a significant difference. This decrease in time for people "on-hold" can be attributed to the DigitalFax's system of relaying the critical status of calls in queue to agents.

The talk-time for each call showed a significant decrease from 187 seconds per call, to 172 seconds. This showed that the agents are handling calls faster and getting to calls in queue more quickly. The corporate set goal of 180 seconds or less may have played a part in this decrease as well as the agents having constant feedback as to how many calls were waiting at any particular time and how they were doing in relation to the goal.

There was no significant change in the number of calls lasting over three minutes. This seems to show that in some cases, no matter how many calls are waiting, some automotive parts are hard to find.

Overall, the DigitalFax system, combined with feedback towards goals, has affected performance positively. Agents are handling calls faster, therefore decreasing talk-time and time "on hold," and making more sales per number of calls than before. Each employee is selling more in less time.

It follows then, that the number of orders and the amount of money taken in by each employee increased significantly over the study period. An average increase of 26.696 orders per employee per week and an increase of \$1,421.70 in retail sales per employee, were experienced.

The efficiency in the performance statistics of talk-time and speed of answer could provide considerable savings to NAC. An average minute of phone time costs the company \$0.09. By cutting the talk-time of 50,000 calls per day by 15 seconds the corporation would save \$1,125 per day. By decreasing on-hold time by 45 seconds, the corporation would cut costs by \$3,375. If these numbers could hold constant over the course of the year, the initial \$70,000 cost of the DigitalFax system would soon be recovered.

Job Satisfaction

One last advantage that this study explored was the impact of positive feedback messages on employee job satisfaction. If agents showed exceptional performance in sales or goal attainment, they were recognized over the DigitalFax system. This study sought to find out if the people who received the messages of positive feedback had higher job satisfaction than those who did not. All agents received at least one message of positive feedback. On the survey statement, "As far as total job satisfaction I am:" it was significant that the people who received the most messages of positive feedback were more highly satisfied with their jobs. These people who received the most messages for

achievement, also achieved more than their peers in terms of productivity. It may be that the agents who received more messages of positive feedback were more productive and were more satisfied than their peers. More control needs to be given in future studies in this area. It is difficult to determine from this study if the people who scored higher on the scale were always the most productive and always the most highly satisfied, and the feedback did not have any impact.

Conclusion

DigitalFax's capability of relaying messages over its screen shows promise in several areas. First, it is an efficient way to relay time-critical messages to the entire department at one time. Also, in speaking with management at NAC, it is their opinion that the number of memos floating around the department has decreased significantly, although no study was done to determine exactly how much less. Another advantage of the system's message relaying capability is the ability of management to give up-to-date performance feedback quickly and easily to agents. As previous studies have shown, if subjects are given feedback as to progress towards pre-set goals, productivity increases.

Granted, with the type of labor in the special orders department, a high level of job satisfaction could not be expected. Several factors that relate to job satisfaction, pay, promotion opportunities, high level of responsibility, and challenging work, cannot realistically be changed. These factors do not rate high for this type of work. But, if the system can at least now recognize people for doing a good job, it may push some of the total satisfaction scores higher for all agents.

In conclusion, it seems the benefits of DigitalFax far outweigh the expense of the system for Northern Automotive Corporation. Talk-time and time-on-hold decreased, while the percent of sales to calls increased. Agent productivity increased significantly in retail sales and orders taken. And finally, the system may have a positive influence on job satisfaction.

Appendix 1. Multidimensional Job Satisfaction Scale

1 2 3 4 5 6 7

Strongly Disagree

Neither Agree
Nor Disagree

Strongly Agree

1. The goals and expectations of each associate are clearly stated and emphasized.
2. You are rewarded for reaching these goals and expectations.
3. It is important to you for management to set department-wide goals for associates.
4. Associates progressing towards job performance goals are encouraged frequently by management.
5. Associates are recognized for doing a good job.
6. On the whole, your job allows you to reach your full potential.
7. You consider your job a secure one.
8. You consider your job challenging and exciting.
9. Your job makes the most of your particular skills.
10. Your job requires a high level of responsibility.
11. You would welcome a higher level of responsibility.

4
4
6
5
5
2
5
5
3
4
7

12. In regards to total job satisfaction, rank the following items with (1) being the most important to you and (7) being least important to you.

the pay you receive

promotion opportunities

good relationship with peers

good relationship with supervisor

recognition of good work

challenging work

high level of responsibility

1

2

7

5

6

4

3

13. Rank the following list from (1), most important, to (6), least important, telling us which job area you think is most important to coach and recognize success.

talk time

average sales

percent of sales to calls

number of sales

number of calls

number of hours worked

4

6

1

2

3

5

14. A realistic talk-time goal for associates should be... (ex. 100 sec., 150 sec., etc.)

15. Realistic weekly dollar sales average for associates should be... (ex. \$20,000, \$30,000, etc.)

16. Realistic percent of sales in relation to calls answered should be... (ex. 20%, 30%, etc.)

17. A realistic customer service survey score should be... (ex. 70, 80, etc.)

180

10,000

29%

85

1 2 3 4 5 6 7

Highly Dissatisfied

Neither Satisfied
Nor Dissatisfied

Highly Satisfied

18. As far as total job satisfaction, I am:

5

Bibliography

- Bandura, A. (1986). Social foundations of thought and action: A social-cognitive view. Englewood Cliffs, NJ: Prentice Hall.
- Bandura, A., and Cervone, D. (1986). Differential engagement of self-reactive influences in cognitive motivation. Organizational Behavior and Human Decision Processes, 38, 92-113.
- Borton, G.F., and Lutton, L.M. (1991, March). Do ACD features meet strategic goals? Business Communications Review, pp. 37-43.
- Champoux, J.E. (1991). A multivariate test of the job characteristics theory of work motivation. Journal of Organizational Behavior, 12, 431-446.
- Earley, P.C., Wojnaroski, P., and Prest, W. (1987). Task planning and energy expended: Exploration of how goals influence performance. Journal of Applied Psychology, 72, 107-114.
- Erez, M., and Zidon, I. (1984). Effect of goal acceptance on the relationship of goal difficulty to performance. Journal of Applied Psychology, 69, 69-78.
- Garland, H. (1984). Relation of effort-performance expectancy to performance in goal-setting experiments. Journal of Applied Psychology, 69, 79-84.
- Garland, H., and Adkinson, J.H. (1987). Standards, persuasions, performance. Group and Organizational Studies, 12, 208-220.
- Henne, D., and Locke, E.A. (1985). Job dissatisfaction: What are the consequences? International Journal of Psychology, 20, 221-240.
- Hollenbeck, J.R., and Klein, H.J. (1987). Goal commitment and the goal setting process: Problems, prospects, and proposals for future research. Journal of Applied Psychology, 72, 212-220.
- Hu, K.L. (1990, November). Already a formidable competitive tool, automatic call distribution systems promise even greater advantages for business in the global economy. CMA Magazine, pp. 8-12.

- Imai, M. (1986). Kaizen: The key to Japan's success. New York: Random House.
- Laporte, R.E., and Nath, R. (1976). Role performance goals in prose learning. Journal of Applied Psychology, 68, 260-264.
- Locke, E.A. (1965). The relationship of task success to task liking and satisfaction. Journal of Applied Psychology, 49, 379-385.
- Locke, E.A. (1968). Effects of knowledge of results, feedback in relation to standards, and goals on reaction-time performance. American Journal of Psychology, 81, 566-574.
- Locke, E.A. (1982). Relation of goal level to performance with a short work period and multiple goal levels. Journal of Applied Psychology, 67, 512-514.
- Locke, E.A., and Bryan, J.F. (1969a). Knowledge of score and goal level as determinants of work rate. Journal of Applied Psychology, 53, 59-65.
- Locke, E.A., and Bryan, J.F. (1969b). The directing function of goals in task performance. Organizational Behavior and Human Performance, 4, 35-42.
- Locke, E.A., Frederick, E., Lee, C., and Bobco, P. (1984). Effect of self-efficiency goals, and task strategies on task performance. Journal of Applied Psychology, 69, 241-251.
- Locke, E.A., and Latham, G.P. (1984). Goal setting: A motivational technique that works. Englewood Cliffs, NJ: Prentice Hall.
- Locke, E.A., and Latham, G.P. (1990). A theory of goal setting and task performance. Englewood Cliffs, NJ: Prentice Hall.
- Locke, E.A., Latham, G.P., and Erez, M. (1988). The determinants of goal commitment. Academy of Management Review, 13, 23-39.

- Locke, E.A., Motowidlo, S.J., and Bobko, P. (1986). Using self-efficacy theory to resolve the conflict between goal-setting theory and expectancy theory in organizational behavior and industrial-organizational psychology. Journal of Social and Clinical Psychology, 4, 328-338.
- MacPherson, G.F., and Cleveland, B. (1990, December). Features, capabilities, and roles change for ACDs. Business Communications Review. pp. 37-41.
- MacPherson, G.F., and Cleveland, B. (1991, December). Advanced ACD technology can create new problems. Business Communications Review. pp. 29-34.
- Mento, A.J., and Locke, E.A. (1990). Studies of the relationship between goals and valences. Journal of Applied Psychology, 74, 198-207.
- Mobley, W.H., and Locke, E.A. (1970). The relationship of value importance to satisfaction. Organizational Behavior and Human Performance, 5, 463-483.
- Mowday, R.T., Porter, L.W., and Steers, R.M. (1982). Employee-organization linkages. New York: Academic Press.
- Organ, D.W. (1987). Organizational citizenship behavior: The good soldier syndrome. Lexington, MA: Lexington.
- Peters, L.H., Chassie, M.B., Lindholm, H.R., O'Connor, R. T., and Kline, C.R. (1982). The joint influence of situational constraints and goal setting on performance and affective outcomes. Journal of Management, 8, 7-20.
- Pritchard, R.D., Jones, S.D., Roth, P.L., Stuebing, K.K., and Ekeberg, S.E. (1988). Effects of group feedback, goal setting, and incentives on organizational productivity. Journal of Applied Psychology, 73, 337-358.

- Salancik, G.R. (1977). Commitment and the control of organizational behavior belief. In B.M Straw and G.R. Salancik (Eds.), New Directions in Organizational Behavior. Chicago: St. Clair Press.
- Shouksmith, G., Pajo, K., and Jepsen, A. (1990). Constructs of a multidimensional scale of job satisfaction. Psychological Reports, 67:355-369.
- Sistachs, J. (1991, November.) New communications technology always wins the business. Communications News, pp. 62-63.
- Stockberger, L., and Castro, E. (1991, December). Status Report: Multimessage platforms. Business Communications Review, pp. 47-50.
- Strang, H.R., Lawrence, E.C., and Fowler, P.C. (1978). Effects of assigned goal level and knowledge of results on arithmetic computation: A laboratory study. Journal of Applied Psychology, 63, 446-450.
- Tanzillo, K. (1991, July). Utility's switch adds agents within seconds. Communication News, pp. 20-21.
- Tanzillo, K. (1992, June). Buying the benefits of ACD for one-seventh the price. Communication News, pp. 14-15.
- Travel firm has no reservations about ACD software. (1992, March). Communication News, pp. 33.
- Vroom, V. (1964). Work and Motivation. New York: Wiley.